Introduction

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Submitter Details

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On behalf of: **Peter and Rachel Garden**
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Trade competition and adverse effects:

(•) I could ( ) I could not

gain an advantage in trade competition through this submission

( ) I am (•) I am not

directly affected by an effect of the subject matter of the submission that :

a. adversely affects the environment, and

b. does not relate to the trade competition or the effects of trade competitions.

Correspondence to:

(•) Submitter

( ) Agent

( ) Both

Submission

Consultation Document Submissions

Thames-Coromandel Proposed District Plan - November 2013 > PART II - OVERLAY ISSUES, OBJECTIVES AND POLICIES > Section 6 - Biodiversity

( ) Support

(•) Oppose

( ) Neutral

Which provisions do you like or want to change in the Thames-Coromandel Proposed District plan?

Remove overlays and have simple rules applying to each zone.

Reason for Decision Requested

We oppose the use of overlays. This method of defining rules means that there is no single place in the plan where a resident can clearly see the rules applying to their property. On some zone maps the overlay boundaries are outside the map and there is no clear indication that an overlay even applies. The plan should be designed to be used by residents NOT just by trained planners. This document appears to be a deliberate obfuscation of the rules to satisfy the planners.

Attached Documents

File
No records to display.

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Submitter Details

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Trade competition and adverse effects:

- ○ I could ● I could not

gain an advantage in trade competition through this submission

- ○ I am ● I am not

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a. adversely affects the environment, and
b. does not relate to the trade competition or the effects of trade competitions.

Correspondence to:

- ● Submitter
- ○ Agent
- ○ Both

Submission

Consultation Document Submissions
Thames-Coromandel Proposed District Plan - November 2013 > PART II - OVERLAY ISSUES, OBJECTIVES AND POLICIES > Section 7 - Coastal Environment

- ○ Support
- ● Oppose
- ○ Neutral

Which provisions do you like or want to change in the Thames-Coromandel Proposed District plan?
I oppose the provisions proposed for the Coastal Environment zone within the newly proposed Coastal Environment line.

Reason for Decision Requested
The provisions placed upon land use within Coastal Environment Line will adversely affect the future land use and value within the line. New Zealand and Coromandel is a young country and we need more high quality development. Property at 235 and 268 Colville road is unecessarily affected which will cause a huge loss of value and restrict progressive land use.

Thames-Coromandel Proposed District Plan - November 2013 > PART II - OVERLAY ISSUES, OBJECTIVES AND POLICIES > Section 9 - Landscape and Natural Character

- ○ Support
- ● Oppose
- ○ Neutral

Which provisions do you like or want to change in the Thames-Coromandel Proposed District plan?
I oppose the amenity Landscape designation and the natural character overlay

Reason for Decision Requested
Properties at 235 and 268 Colville Road are adversely affected by the provisions. Also the 5 properties at Kikowhakarere Bay are adversley affected. It is a direct breach of land ownership rights. Many high quality properties on the Coromandel have been owned and managed by long standing families for generations. These families and iwi have been the caretakers of the land that council which to control. Council should look after their own public issues and land holdings more closely.

Thames-Coromandel Proposed District Plan - November 2013 > PART IV - AREA ISSUES, OBJECTIVES AND POLICIES > Section 24 - Rural Area

- ● Support
- ○ Oppose
- ○ Neutral

Which provisions do you like or want to change in the Thames-Coromandel Proposed District plan?
I Support retaining of the rural lifestyle zone in Coromandel at the Southern end of the property at 235 Colville Road. This will be lost under the proposed plan changes.

Reason for Decision Requested
This section of land is arable and of gentle enough contour for further development for lifestyle blocks. There is not a lot of land near to Coromandel town that is suitable for any development, so this possibility should not be lost. Any change to zoning could incur major financial costs to the owner if blocked by new zoning rules.

Thames-Coromandel Proposed District Plan - November 2013 > PART VI - OVERLAY RULES > Section 32 - Landscape and Natural Character Overlay
- ○ Support
- ◉ Oppose
- ○ Neutral

Which provisions do you like or want to change in the Thames-Coromandel Proposed District plan?
I oppose the landscape and natural character overlay. Especially relating to properties at 235 & 268 Colville Road. Kikowhakarere Bay & Shelly Bay.

Reason for Decision Requested
The landscape and natural character overlays will add unnecessary costs to owning and managing land in the coromandel peninsula. Land owners will need to be compensated for their loss of land use rights.

Thames-Coromandel Proposed District Plan - November 2013 > PART VIII - ZONE RULES > Section 41 - Coastal Living Zone
- ◉ Support
- ○ Oppose
- ○ Neutral

Which provisions do you like or want to change in the Thames-Coromandel Proposed District plan?
I believe that the TCDC should retain the Coastal Living Zone at 235 and 268 Colville Road, Kikowhakarere Bay.

Reason for Decision Requested
Loss of this zoning would be a huge loss of value to the landowner, with no compensation. This proposed subdivision best lends itself to development for Coastal living as there is no other land available for development in this area that has such a good aspect with little adverse environmental affects. There is very little farming income from the land and the community would benefit more from having the high quality, low density, Coastal living.

Thames-Coromandel Proposed District Plan - November 2013 > PART VIII - ZONE RULES > Section 57 - Rural Lifestyle Zone
- ◉ Support
- ○ Oppose
- ○ Neutral

Which provisions do you like or want to change in the Thames-Coromandel Proposed District plan?
I support the rural lifestyle zone. Especially to remain at property of 235 Colville Road, Coromandel.

Reason for Decision Requested
A change of zoning over any rural lifestyle zoned property would make any development unnecessarily costly and slow to progress. There would need to be compensation given to the land owner.

Attached Documents

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○ I could ◉ I could not
gain an advantage in trade competition through this submission
○ I am ○ I am not
directly affected by an effect of the subject matter of the submission that :
a. adversely affects the environment, and
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Correspondence to:
○ Submitter
◉ Agent
○ Both

Agent Details

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Agent Phone: **04 806 4987**
Agent Mobile: **021 496 185**
Agent eMail: **egrace@tonkin.co.nz**

Submission

Attached Documents

File
NZDFSubmission incl attachments

New Zealand DEFENCE FORCE
Te Ope Kātua O Aotearoa
NAVY NZARMY AIR FORCE

Defence Shared Services
National Service Centre
Alexander Road
Private Bag 902
Trentham
Upper Hutt 5140, New Zealand

Submission on Proposed Thames Coromandel District Plan

Clause 6 of First Schedule, Resource Management Act 1991

To:	Thames-Coromandel District Council
Address:	Private Bag Thames 3540
Submitter:	New Zealand Defence Force
Contact Person:	Emily Grace, Tonkin & Taylor Ltd
Address for Service:	New Zealand Defence Force C/- Tonkin & Taylor Ltd PO Box 2083 Wellington 6140 Attention: Emily Grace
Phone:	04 806 4987
Fax:	04 381 2908
Email:	egrace@tonkin.co.nz

Preliminary Matters

This is a submission on the Proposed Thames-Coromandel District Plan (the Proposed Plan).

New Zealand Defence Force (NZDF) could not gain an advantage in trade competition through this submission.

This submission relates to provisions in the Proposed Plan relating to military training activities undertaken by NZDF and noise, rules for which appear in all zones.

NZDF wishes **to be heard** in support of this submission.

If others make a similar submission, **NZDF will consider** presenting a joint case with them at the hearing.

Submission Point 1

Plan Provision: Permitted activity rules for military training in each zone

NZDF supports these rules.

Relief Sought: Retain the permitted activity status for military training in every zone.

Reasons:

Each zone contains a permitted activity rule for "*emergency service training, military training*". It is appropriate that military training is permitted throughout the District, and NZDF supports the inclusion of this activity status.

Submission Point 2

Plan Provision: Permitted activity rules for noise and military training in each zone

NZDF opposes these provisions in part.

Relief Sought: Include permitted activity noise standards specific to military training (as in Attachment 1 to this submission) within the District Plan, as part of each permitted activity rule for military training.

Reasons:

It is not clear whether the permitted activity noise rules in each zone apply to noise from military training activities. This is because the activity the noise rule applies to is "*noise not covered by another rule*". As there is no mention of noise in the permitted military training rule, it is unclear whether noise is 'covered' by the permitted activity rule for military training.

Noise from military training, particularly training involving the firing of weapons, has the potential to have an impact on the amenity levels of the surrounding area. NZDF considers it appropriate for the district plan to include standards controlling noise from military training activities. NZDF therefore requests that the noise standards included in Attachment 1 to this submission are included in the Proposed Plan for military activities.

Due to the way the Proposed Plan is structured, with separate noise rules in each zone that address noise 'not covered by another rule', it is appropriate that the noise standards specific to military training are included with the permitted military training rule(s), rather than with the noise rule.

NZDF wishes to make sure that the noise standards included in the Proposed Plan to control noise from military training are up-to-date, appropriate for the type of noise generated and relatively simple to understand and assess compliance with. To this end, NZDF has commissioned professional acoustic advice on appropriate standards to control noise effects from military training activities. This advice is contained in Attachment 2 to this submission.

The noise standards proposed by NZDF focus on compliance at dwellings, residentially zoned sites, and buildings used for residential, educational or healthcare purposes.

In summary, NZDF's proposed standards divide noise sources from military training activities into three categories: weapons firing and explosions; other mobile sources such as vehicles and earthmoving equipment; and fixed noise sources such as power generators and water pumping. Each of these noise sources has different noise characteristics, and therefore a different set of standards for controlling noise. NZDF considers that this division allows a comprehensive and appropriate method for controlling noise from military training activities.

For weapons firing and explosives, the noise control standard used is separation distances between the activity and any sensitive receiver (dwelling, residentially zoned site, or building used for residential, educational or healthcare purposes). Four separation distances are specified – a night-time and daytime distance for firing of live ammunition and explosives, and a night-time and daytime distance for firing of blank ammunition, which is less noisy than live firing. The distances have been arrived at after review and analysis of data measured from real military activities, to ensure that the sound levels received at the specified distances will be reasonable (generally less than 55 dBA for daytime and less than 45 dBA for night-time). Using separation distance as a standard has the advantage of being an easy to comply with and easy to monitor standard.

For mobile noise sources (other than weapons firing and explosives), compliance with the construction noise standards is recommended, as this standard most appropriately addresses this type of noise.

For fixed noise sources, which can be located to ensure compliance with standards, dB L_{Aeq} levels are specified, in line with *NZS6802:2008 Acoustics – Environmental Noise*. This is considered the most appropriate way to control noise levels from these sources.

Submission Point 3

Plan Provision: Permitted activity rules for military training in each zone – military training that is not permitted.

NZDF supports these rules in part.

Relief Sought:

(a) Include a statement within the permitted rules for military training, that military training that does not comply with the permitted activity noise standards, proposed to be included as per NZDF submission point 2 above, is a controlled activity.

(b) Introduce a new matter for control for the new controlled activity: *the effects on amenity of exceeding the permitted activity noise standards.*

Reasons:

Military training is an essential activity undertaken by the Defence Force. If this training cannot be undertaken in compliance with the permitted activity noise standards, then it is appropriate that a controlled activity resource consent be required, so that effects on amenity from the activity can be considered and appropriately addressed.

Submission Point 4

Plan Provision: Lack of a definition of 'Military Training'.

NZDF opposes the lack of a definition.

Relief Sought: Include a definition of Military Training within the definitions section of the Proposed Plan, as follows:

> *Military Training: a military activity undertaken for defence purposes. The term 'defence purposes' is as defined in the Defence Act 1990.*

Reasons:

The Proposed Plan includes a definition of 'emergency service training', but no definition of 'military training'. Both of these activities are provided for by the one permitted activity rule. NZDF seeks for a definition of 'military training' to also be included in the Proposed Plan, to assist with understanding of the provisions. The definition recommended is largely consistent with definitions included in other district plans around the country.

14 March 2014

Signed on behalf of New Zealand Defence Force

Attachment 1: Permitted activity standards for controlling noise effects from military training activities

Rule xx:
2. Permitted Military Training shall comply with the noise standards specified in Table x below.

Table x

<table>
<tr><td colspan="6">Noise Controls</td></tr>
<tr><td>Type of military noise source</td><td colspan="5">Standards</td></tr>
<tr><td rowspan="11">1. Weapons firing and/or the use of explosives</td><td colspan="5">1. Notice is provided to the Council at least 48 hours prior to the commencement of the activity, specifying whether the activity involves live firing and/or the use of explosives, or firing of blank ammunition; the location of the activity and the boundaries within which the activity will take place, and distances to buildings housing noise sensitive activities; and the timing and duration of the activity.</td></tr>
<tr><td colspan="5">2. Compliance with the noise standards below:</td></tr>
<tr><td></td><td>Time (Monday to Sunday)</td><td colspan="3">Separation distance required between the boundary of the activity and the notional boundary to any building housing a noise sensitive activity</td></tr>
<tr><td rowspan="2">i. Live firing of weapons and single or multiple explosive events</td><td>0700 to 1900 hours</td><td>At least 1500m</td><td colspan="2">Less than 1500m if conditions (a) and (c) below are complied with</td></tr>
<tr><td>1900 to 0700 hours</td><td>At least 4500m</td><td colspan="2">Less than 4500m if conditions (b) and (c) below are complied with</td></tr>
<tr><td rowspan="2">ii. Firing of blank ammunition</td><td>0700 to 1900 hours</td><td>At least 750m</td><td colspan="2">Less than 750m if conditions (a) and (c) below are complied with</td></tr>
<tr><td>1900 to 0700 hours</td><td>At least 2250m</td><td colspan="2">Less than 2250m if conditions (b) and (c) below are complied with</td></tr>
<tr><td colspan="5">Conditions to be complied with if minimum separation distances for sources 1(i) and 1(ii) cannot be met:</td></tr>
<tr><td>Condition</td><td colspan="2">Time (Monday to Sunday)</td><td colspan="2">Noise level at the notional boundary to any building housing a noise sensitive activity</td></tr>
<tr><td>(a)</td><td colspan="2">0700-1900hrs</td><td colspan="2">Peak sound pressure level of 120 dBC</td></tr>
<tr><td>(b)</td><td colspan="2">1900-0700hrs</td><td colspan="2">Peak sound pressure level of 90 dBC</td></tr>
</table>

	(c)	The activity is undertaken in accordance with a Noise Management Plan prepared by a suitably qualified expert and approved by Council at least 15 working days prior to the activity taking place. The Noise Management Plan shall, as a minimum, contain: • A description of the site and activity including times, dates, and nature and location of the proposed training activities. • Methods to minimise the noise disturbance at noise sensitive receiver sites such as selection of location, orientation, timing of noisy activities to limit noise received at sensitive receiver sites. • A map showing potentially affected noise sensitive sites and predicted peak sound pressure levels for each of these locations. • A programme for notification and communication with the occupiers of affected noise sensitive sites prior to the activities commencing, including updates during the event. • A method for following up any complaints received during or after the event, and any proposed de-briefing meetings with Council.

2. Mobile noise sources, excluding sources 1(i) and 1(ii)	Compliance with the noise limits set out in Tables 2 and 3 of *NZS6803:1999 Acoustics – Construction Noise*, with reference to 'construction noise' taken to refer to other, mobile noise sources*		
Note: mobile noise sources (other than firing of weapons) include sources such as personnel, light and heavy vehicles, self-propelled equipment, earthmoving equipment			
3. Fixed (stationary) noise sources, excluding sources 1(i) and 1(ii)	**Time (Monday to Sunday)**	**Noise level at the notional boundary to any building housing a noise sensitive activity ***	
	0700 to 1900 hours	55 dB $L_{Aeq\ (15\ min)}$	n.a.
	1900 to 2200 hours	50 dB $L_{Aeq\ (15\ min)}$	
	2200 to 0700 hours the next day	45 dB $L_{Aeq\ (15\ min)}$	75 dB L_{AFmax}
Note: fixed (stationary) noise sources (other than firing of weapons and explosives) include noise sources such as power generation, heating, ventilation or air conditioning systems, or water or wastewater pumping/treatment systems.			
4. Helicopter landing areas	Compliance with noise limits set out in *NZS6807:1994 Noise Management and Land Use Planning for Helicopter Landing Areas**		

* Noise levels shall be measured in accordance with NZS6801:2008 Acoustics – Measurement of Sound

Attachment 2: Acoustic Report

New Zealand Defence Force

Re-Assessing Noise from Temporary Military Training in New Zealand

District Plan Recommendations

MHA Reference: 932-0F3
January 2013

Prepared by:

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noise and environmental consultants
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Prepared For:

Tonkin & Taylor

New Zealand Defence Force

New Zealand Defence Force

Re-Assessing Noise from Temporary Military Training in New Zealand

District Plan Recommendations

MalcolmHuntAssociates

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CONTENTS

New Zealand Defence Force

Re-Assessing Noise from Temporary Military Training in New Zealand

District Plan Recommendations

MalcolmHuntAssociates

noise and environmental consultants

Executive Summary

This report reviews noise and vibration controls applying to Temporary Military Training (TMT) activities specified within District Plans for the control of potential noise disturbance caused by these activities. These District Plan noise rules apply to activities undertaken on behalf of, and organised by, NZDF which may take place in any area according to training needs at the time. Specialised rules and requirements are necessary in District Plans to ensure normally applied District Plan noise limits are not applied to TMT activities which have always been considered a special case due to the need for such TMT exercises to take place in any part of a district, at any time, with noise effects themselves being temporary in nature and highly intermittent.

This review highlights potential noise and vibration effects of typical TMT activities by quantifying expected decibel levels in a generic sense in order to evaluate the nature and scale of TMT noise emissions and to test possible noise limits or rules. As a minimum, calculated noise emission levels set out in this report enable testing to check the reasonable needs of NZDF are adequately provided for, considering the appropriate scale and magnitude of potential noise levels.

The approach previously recommended by NZDF for managing noise from TMT activities is recommended to be upgraded and replaced with a more targeted approach that includes technical improvements recommended within recent New Zealand acoustic Standards.

Noise controls have been developed that cover three categories of TMT activities as follows:

- ***A. TMT activities involving weapons firing, detonations and pyrotechnics;***
- ***B. Mobile TMT noise sources, not including A (above);***
- ***C. Fixed or stationary TMT noise sources not including A (above).***

The methods recommended for adoption do not rely solely on specifying decibel limits applicable to each category of noise source. Achieving a minimum threshold separation distance from sites where potentially noisy weapons firing or loud explosive sounds take place to the nearest noise sensitive receiver site is a key element of the approach recommended for this noise source category which has the highest potential to create adverse noise effects over wide areas. TMT activities involving firing and explosive sounds are proposed to be permitted to occur within the minimum separation distances outlined below, however in those cases the activities would be required to be undertaken in accordance with a certified Noise Management Plan to ensure the heightened risk of adverse noise effects is adequately managed. Limits applying to peak sound pressure levels from TMT activities involving weapons firing or explosive sounds applying at the closest sensitive receiver site ensures an adequate baseline protection from the potential health and amenity effects of loud noise received from these sources.

Considered as a whole, the recommended approach provides an effective and flexible approach which acknowledges the over arching duty to adopt the "best practicable option" to avoid the emission of unreasonable noise.

Adopting the recommended approach within new generation District Plans will ensure the rules are technically up to date, whilst ensuring the control measures fit the type of sound source and a degree of flexibility is provided given the temporary nature of the potential noise and vibration.

New Zealand Defence Force

Re-Assessing Noise from Temporary Military Training in New Zealand

District Plan Recommendations

MalcolmHuntAssociates

noise and environmental consultants

1 Introduction

Malcolm Hunt Associates, at the request of New Zealand Defence Force [NZDF] have undertaken a technical review of temporary military training activities noise and vibration provisions, as found in many existing District Plans in New Zealand. These established noise limits and requirements have been evaluated from an effectiveness and efficiency perspective, also considering new techniques now available through the adoption more recent NZS acoustic standards released since most current District Plans came into effect.

Potential noise and vibration effects of NZDF "temporary military training" (TMT) activities have been quantified in a general sense to evaluate the nature and scale of TMT noise emissions and to test possible new noise limits or rules. As a minimum, the noise emission calculations provided enable the reasonable needs of NZDF to be established to ensure any new recommendations adequately provide for infrequent noise from TMT activities.

An example of the wording of measures currently adopted into "first generation" district plans in New Zealand to control noise effects associated with TMT activities is set out in ***Section 3.0*** below. Traditionally, such noise provisions do not apply to any site designated under the RMA for military training purposes[1] but are instead intended to apply to temporary or one-off exercises undertaken from time to time in accordance with training needs assessed at the time.

This assessment has specifically considered changes to the existing District Plan TMT noise provisions to make the rules more targeted and to ensure consistency with recommendations of the more recent NZ acoustic standards. Existing district plan provisions such as those set out in ***Section 3.0*** are technically challenging to assess compliance with, especially as key components are missing, and due to complexities when multiple noise limits are specified using various noise metrics (two of which are out-of-date), with a different decibel limit applying to each metric. Critically, no night time Lmax limit is proposed to protect noise sensitive sites from noise due to night time single events. Overall, the existing wording appears inadequate and inefficient with questionable technical merit.

The preferred approach to controlling noise from TMT activities has been developed to simplify applicable noise limits and ensure they are well matched to the various categories of TMT activities. The recommended limits discussed below are based on:

- Mobile TMT noise sources - NZS6803:1999 *Acoustics – Construction Noise* has been examined as a better alternative.
- Fixed TMT noise sources – These sources are fixed plant such as pumps and motors and are amenable to being positioned at locations remote from noise sensitive sites, or are capable of being screened, enclosed or otherwise reduced via physical means. Thus, limits for fixed sources are based on the more stringent guidance for noise sensitive sites provided within NZS6802:2008 *Acoustics – Environmental Noise*

[1] It is inappropriate to apply the term "temporary" to military training activities taking place on sites specifically designated in a District Plan for that purpose.

- Weapons firing, detonations and pyrotechnics – this is based on a minimum setback to noise sensitive sites rather than a noise limit per se. An additional large buffer is recommended to apply for any TMT site where these activities are proposed to be undertaken during night time. A smaller setback has been recommended where these TMT sounds are limited to light weapons firing blank ammunition.

In addition to specifying maximum noise levels, measures to mitigate noise emissions associated with TMT activities including minimum setback distances and the preparation of a Noise Management Plan also form part of the recommended approach. These measures particularly target TMT activities involving weapons firing and explosive sounds as these type of sounds have significant potential for inducing annoyance at noise sensitive receiver sites.

The recommended approach provides flexibility in avoiding unreasonable or excessive noise as the limits and requirements target specific sources which, when considered as a whole, provide a more effective approach to controlling noise from TMT, recognising the over arching duty for the noisemaker (including the Crown) to adopt the "best practicable option" to avoid the emission of unreasonable noise.

2 Effects Of Noise

Research to date into the effects of environmental noise have been mainly based on measuring the annoyance reaction, or the extent to which noise disturbs various activities undertaken by people. Annoyance the most commonly expressed reaction by those exposed to intrusive sound in the environment.

At a biological level, noise is considered a nonspecific stressor that may cause adverse health effects on humans in the long term. Epidemiological studies suggest a higher risk of cardiovascular diseases, including high blood pressure and myocardial infarction [heart attacks], in people chronically exposed to high levels of road or air traffic noise[2]. In many cases noise occurring in the environment is simply intrusive, interfering with listening to television or radio or affecting the enjoyment of quiet outdoor areas around in the home or in parks or reserves.

The effects of environmental noise are usually expressed in terms of:

- Annoyance;
- Speech interference - high levels of noise can make normal speech difficult to hear
- Performance - some noises can make concentration difficult and interfere with tasks such as learning, checking fine details [such as any job with a large mathematical component or where the meaning of words is critical] or work where small, precise, movements or intense concentration is required;
- Mental health [including noise-induced stress-related effects];
- sleep disturbance - in addition to fatigue and mental health effects, disrupted sleep patterns can leave people irritable, change their behaviour, and reduce their ability to work or perform tasks.

There is scientific evidence to show that prolonged exposure to environmental noise can induce hypertension and ischemic heart disease, annoyance, sleep disturbance, and decreased learning performance in the classroom. However for effects such as changes in the immune system and birth defects, the evidence is very limited [WHO 1999].

Most public health impacts of environmental noise were identified as far back as the 1960's with research in more recent times concentrating on the elucidation of the mechanisms underlying the known effects, such as noise induced cardiovascular disorders and the relationship of noise with

2 WHO Burden Of Disease From Environmental Noise - Quantification Of Healthy Life Years Lost In Europe. World Health Organisation, Geneva, 2011.

annoyance and non- acoustical factors modifying health outcomes[3]. The Ministry of Health monitors protection of public health from environmental noise through reporting by National Environmental Noise Service [NENS] which it funds. NENS has been closely involved in developing and revising various New Zealand acoustic standards, including NZS 6802, a key Standard guiding on the assessment of noise referred to within District Plans, and within the discussion below.

Thus to reasonably provide for the protection of health and amenity, recommendations for managing environmental noise should adhere to the guidance set out within NZS6802, in this case the 2008 version which supersedes the 1991 version referred to within most District Plans. A discussion of other relevant New Zealand acoustic Standards is set below in ***Section 6.0***.

3 Existing TMT Noise Rules

The wording of many existing District Plan provisions applying to noise from TMT activities in various zones of a District Plan (possibly all zones) is typified by the wording set out below which in this case is taken from the Operative Horowhenua District Plan;

All noise emitted in the course of any temporary military training activities measured from a line 20 metres from and parallel to the facade of any dwelling or the legal boundary, where this is closer to the dwelling, shall not exceed the following levels:

Time	Limits (dBA)		
(Any day)	L10	L95	L_{max}
0630-0730	60	45	70
0730-1800	75	60	90
1800-2000	70	55	85
2000-0630	55		

Impulse Noise resulting from the use of explosives small arms is not to exceed 122 dBC.

Temporary Military Training Activity *means a temporary military training activity which may include an activity on the surface of any waterbody, undertaken for Defence purposes. Defence purposes are those in accordance with the Defence Act 1990. The Defence Act also enables access to Defence areas which include areas utilised for temporary military training activities, to be restricted.*

Such existing rules used to control noise from temporary military training activities within the District Plans use FOUR different noise metrics as follows;

- L_{max} [dBA]
- L_{10} [dBA]
- L_{95} [dBA
- L_{Peak} [dBC]

L_{max} is considered necessary as a measure to quantify and control single noise events, however such methods are not sensitive enough tom adequately measure the peak sound pressure from weapons firing, explosives and pyrotechnics. In the case of those sounds, the C frequency weighted peak sound pressure level (Lpeak dBC) is the most appropriate measurement unit. The use of both the L_{10} and L_{95} units with noise is not considered necessary, see discussion below.

[3] *Noise Exposure and Public Health* Willy Passchier-Vermeer and Wim F. Passchier, Environmental Health Perspectives, Vol 108, Supplement I, March 2000.

A technical review has taken place of the existing approach to controlling noise from TMT, as typically set out above, adopted into many District Plans in New Zealand. The review has found the following deficiencies exist with the current typical approach;

1. No acoustic Standards are referred to. It may be assumed the 1991 versions of NZS6801 and NZS6802 would apply, or at least the versions of these Standards referred to within the District Plan in question.
2. In the example quoted above, there are no Lmax limits applying at night. Sound from single noise events occurring at night time are usually controlled by specifying and Lmax night time limit, which is the recommended approach of NZS6802:2008.
3. There is questionable utility of setting numerical decibel limits in terms of 4 separate noise units which can lead to potential complications and unnecessary complexity when establishing compliance. As described below, the new Leq unit replaces essentially both the L10 and L95 unit for which numerical decibel limits are currently specified.
4. There is a focus on control via setting decibel limits only. This requires technical expertise in terms of assessing compliance and in the planning of activities to avoid non-compliance. An alternative approach proposed below is based on specifying a setback or separation distance to identify a threshold beyond which noise effects associated with impulse sounds are adequately controlled to low levels. Such thresholds can be simple to implemented and require less technical input which is an appropriate response where it can be demonstrated only minor or *di minimus* noise effects would be experienced at noise sensitive locations found at or beyond this threshold separation distance. This approach is adopted below for managing loud impulsive sounds associated with weapons firing, pyrotechnics and detonations. Where certain minimum setback distances to noise sensitive sites cannot be achieved the recommended approach is to require a technical site-specific assessment and with enhanced noise management responsibilities applying.
5. Currently, numerical noise limits apply equally to all categories of TMT activities when in fact noise emissions associated with some aspects of TMT activities are easier to control in accordance with the RMA "best practicable option" compared to other aspects (eg. sound from fixed (stationary) sources is easier to control than sounds associated with live firing for example).
6. The TMT noise limits are fixed independent of the duration of the TMT activities on any particular site. Current recommendations for controlling TMT noise do not reflect the fact that receiver's of noise can tolerate higher levels for shorter periods, but noise lowered limits are usually when sound sources are constantly present within the environment for extended periods (for example, sound sources present in the environment for periods of several weeks or months). An example of an approach that neatly deals with increased sensitivity to elevated noise exceeding certain specified duration period is the approach of the NZ construction noise Standard NZS6803:1999 which recommends different Leq and Lmax limits depending upon the construction activity duration. The time periods specified are;

    - "short term" period (less than 2 weeks)
    - "typical" period of 2 weeks to 20 weeks
    - "long term" period of more than 20 weeks.

    The limits for "short term" construction activities are set 5 dB higher than limits for "typical duration" activities, with the limits applying to "long term" construction activities set 5 dB lower again. Measures such as these adapted to the control of noise from TMT activities would be an efficient method to reflect the increased sensitivity to noise sources that are present within noise sensitive environments over extended periods.

4 TMT Noise Levels

NZDF direct considerable resources into training activities, including Temporary Military Training (TMT) conducted from time to time on sites remote from established NZDF bases designated for this purpose, such as Waiouru, Tekapo. West Melton and Burnham Military Camp.

By agreement with land owners, TMT is conducted on sites owned by others at various locations across New Zealand. Sites suitable for TMT are generally remote from sensitive sites such as residential areas, schools and hospitals. In addition, the recommended approach imposes an obligation to undertake TMT activities in accordance with a certified Noise Management Plan where minimum separation distances top noise sensitive sites are not able to be achieved.

For the purposes of assessing and controlling this noise impact, this investigation has divided TMT activities into TWO groups as follows;

4.1 Category 1 - Non-Weapons & Pyrotechnic TMT

This category encompasses the range of noise emissions expected to arise from the temporary occupation of a site for TMT activities involving any of the following but not including any pyrotechnics explosions, detonations or live firing of weapons:

a) **Mobile sources** - Operation of motorised equipment including vehicles such as light and heavy vehicles, troop carriers, earth moving equipment, construction equipment, etc. including helicopter activity on the TMT site. This category includes people sounds from personnel during both the training exercises and at other times whilst the site is occupied for TMT purposes.

In terms of possible limits on noise from mobile sources, these types of sources may be permitted at higher levels at noise sensitive sites than fixed noise sources (as below) as effects of mobile sources tend to be infrequent and intermittent due to the source(s) being mobile. Due to the high degree of infrequency of sounds from TMT activities, not represent anything other than a temporary effect on the environment, the usually allowable limits for residential and noise sensitive sites may be relaxed without resulting in unacceptable effects. This is the basis of the elevated noise limits recommended for temporary construction noise assessed under NZS6803:1999. At clause 8.6.11 of NZS6802:2008 this Standard allows some specific activities to exceed the normally applied District Plan noise limits "*where it is desired to allow for certain activities within a district*". Recommended noise limits for below for Category 1 (Mobile) sources are based on noise limits set out within NZS6803:1999 for sensitive receiver sites.

Fixed Sources - Operation of fixed plant and equipment involved in infrastructure support such as pumps, motors and generators associated with providing electricity, canteen services, waste disposal, etc. Fixed sources are able to be located. Oriented (and if necessary screened or enclosed) such that noise levels experienced at noise sensitive sites should be controlled to a level commensurate with protecting health an amenity at these sites. Recommended noise limits for Category 1 (Fixed) sources are the limits set out within NZS6802:2008.

4.2 Category 2 - TMT Involving Weapons Firing & Pyrotechnics

This category of TMT includes all of the above sources (Non-weapons & Pyrotechnic TMT sources) as well as any sounds associated with:

- Weapons Firing:
  Small Arms: Styer rifle
  9mm Pistol
  Machine Gun; Minimi C9 Light Machine Gun
  MAG™58 7.62mm Machine Gun
  L7A2 7.62mm Machine Gun
  Browning .50 Calibre Machine Gun
  [*NB. Includes firing blanks or firing of live rounds*]

- Artillery:
  105mm Light Gun L119
  Javelin medium range anti-armour weapon [MRAAW]

- Mortar:
  81mm Mortar L16A2

- Demolitions
  Controlled explosion of up to 5 kg CNE

- Battle Simulation:
  Combat Simulation Systems - Pyrotechnics for live fire training and combat simulation.

In order to complete training requirements these potentially noisy firing activities are occasionally conducted on private land associated with TMT. NZDF advise the planning for such exercises involving live firing (or firing blanks and / or simulation pyrotechnics) is planned well in advance and entails the primary consideration of safety for NZDF personnel on site, and members of the public in the area. We understand each class of weapon / ammunition must operate within a specific safety template that would need to be satisfied by the available buffer areas and separation distances to sensitive sites and areas before the use of that class of weapon can be approved for use on the subject site.

4.3 Noise Assessment Factors

In assessing the most effective and most efficient methods for characterising, quantifying and controlling noise from TMT activities, the following factors have been taken into account;

Duration of TMT activities - The duration of TMT activities on sites not owned by NZDF could be as short as few hours to a few days, up to 90 days or more. Concerning the duration of actual noise-making activities, the noise assessment method needs to take account of amount of noise emitted over a given time period. This is achieved by adopting the Leq unit which considers sound exposure averaged over specified time periods, and operates on the equal energy principle (meaning a loud, few short duration noise events would have a similar affect as sound at a lower level than was present for longer periods).

Scale of TMT Effects - The minimum scale of TMT activities could, at one end, simply involve noise from one NZDF person entering onto a site for example to drive a light vehicle to practice field driving for a few hours during daytime, through to a major encampment on private land involving upwards of 500 personnel, including a hundred or more vehicles, portable plant items, with the training itself involving live firing, pyrotechnics, etc. including possible night manoeuvres involving live firing of weapons at night. The recommendations of this report are intended to cater for this wide range in possible noise and vibration effects.

As described below, noise impact of the larger scale events are appropriately controlled in planning decisions to locate TMT activities on sites with a sufficiently large buffer distance available to reduce noise effects to acceptable levels when received at any noise sensitive locations in the area.

Definition of "Noise Sensitive Site" – Receiver sites to be protected from unreasonable noise are usually defined as including residential, educational or health care facilities including aged care facilities. Although variations in definitions of such sites exist, the thrust is to protect locations where people sleep, relax or within buildings where a controlled sound environment is critical and is the approach recommended below. The recommendations of this report centre on protecting noise effects experienced at or within the 20 metre notional boundary to any dwelling, or buildings used for residential, educational or health care purposes, or within any residentially zoned site, in accordance with NZS6801:2008 *Acoustics – Measurement of Sound* (except for noise from "mobile noise sources" which adopts the methodology of NZS6803:1999 *Acoustics – Construction Noise* and are therefore assessed at 1 metre from the building).

Also it is noted Table 3 of NZS6803:1999 refers to less stringent guideline limits as adequate to protect commercial and industrial sites which is a useful added guideline.

Due to the temporary and highly intermittent nature of noise effects of TMT activities experienced within any park, reserve or recreational area, these do not warrant any specific control limit, suffice to mention the duty under RMA s.16 for NZDF to avoid unreasonable noise effects on civilians occurring in such areas during training exercises.

Night time noise – Typical TMT activities take place during daytime with less activity during the night time period. However on isolated occasions noise will arise due to night time manoeuvres due to personnel, vehicles or combat simulation. These night time activities are usually planned well in advance. Measures currently used to properly plan such events and inform the community are discussed below. NZDF procedures ensure any events involving firing or pyrotechnics at night are located further from noise sensitive sites compared to TMT involving daytime exercises only, reflecting the NZDF's awareness of sensitivity of the community to noise during night time.

Concerning methods to minimise night time noise disturbance, NZDF are advised that to avoid sleep disturbance from TMT activities involving night time firing and detonations / pyrotechnics, it will be necessary to conduct these exercises on sites with a significantly greater setback than adopted below for managing daytime noise (unless specific approvals have been received from noise sensitive sites within this recommended setback). The setback recommended below for night time TMT activities involving night time firing and detonations / pyrotechnics is based on around 8 to 10 dB lower sound levels and are designed to ensure indoor sleep is protected with windows open. This does not ensure sounds of such activities will be inaudible within dwellings located beyond the recommended setback distance.

Vibration – According to the RMA, the term "noise" includes vibration. Vibration associated with TMT activities can be classified as either "ground borne" or "airborne". In the case of ground borne vibration, this can be caused by the use of heavy vehicles, tracked vehicles, earthmoving equipment, or detonations or demolition explosives. The degree of vibration effect will vary according to the source however vibration effects would only be able to be detected locally, within 100 to 200 metres from source, at most. Airborne sound from explosions, artillery, or detonations can result in a "blast over-pressure" effect similar to vibration however these too are only experienced locally with no vibration effects likely to be detectable beyond 1,500 metres. A minimum threshold distance of 1,500 metres offers sufficient protection for vibration effects both on humans or damage risk criteria for building damage. Where these activities take place within the 1,500 metre minimum setback, compliance with the recommended limit on peak sound pressure levels of 120 dBC would ensure airborne and ground borne vibration effects are adequately controlled to acceptable levels.

Helicopter Noise - Noise effects from TMT events or manoeuvres occasionally involve the use helicopters. The RMA restricts the ability of District Plans to control helicopter noise when in flight, and only allows local authorities to control noise in relation to the use of landing sites only. These noise effects are assessed below, taking into account the rare use of any particular site for helicopter landing in support of TMT activities. Effects are disregarded where the number of landings falls below 10 flights per month (or any event exceeds Lmax 70 dBA between 10pm to 7 am, or Lmax 90 dBA at any other time) which is the threshold for applying the recommendations of the relevant NZ Standard used to assess helicopter noise (NZS6807:1884, see below).

5 Predicted Noise Levels

Expected noise levels received at various distances have been predicted based on generic measured noise levels at source, based on measured noise levels associated with NZDF training activities held at Waiouru Military Training Area, Ardmore Military Training Area, and the West Melton Military Training Area.

Predictions of sound levels has been conducted using computer-based prediction programs based the algorithms set out within ISO 9613-2:1996[4]. The prediction method involves specifying input variables such as sound power levels at source, air absorption values based on temperature and humidity. The resultant noise levels at various distances for the various noise source categories are set out below in **Table 1**.

Expected Lmax and Leq noise levels versus distance from Table 1 are reproduced diagrammatically in **Figure 1** and **Figure 2** below.

		10 METRES			100 metres			1,000 metres			1,500 Metres			4,500 Metres		
Category 1 Sources		Leq	Lmax	Peak	Leq	Lmax	Peak	Leq	Lmax	Peak	Leq	Lmax	Peak	Leq	Lmax	Peak
MOBILE:	Heavy Vehicles	88	92	94	69	73	75	51	55	57	48	52	54	39	43	45
	Armed personnel / LAV	89	93	98	70	74	79	52	56	61	49	53	58	40	44	49
	Unimog	82	85	89	63	66	70	45	48	52	42	45	49	33	36	40
	Excavator	85	94	98	66	75	79	48	57	61	45	54	58	36	45	49
	Loader	86	96	103	67	77	84	49	59	66	46	56	63	37	47	54
FIXED:	100 kVA generator	71	73	75	52	54	56	34	36	38	31	33	35	22	24	26
	water pumps	62	65	66	43	46	47	25	28	29	22	25	26	13	16	17
	Kitchen plan	59	62	63	40	43	44	22	25	26	19	22	23	10	13	14
Category	Howitzer	118	131	143	99	112	124	81	94	106	78	91	103	69	82	94
	81mm Mortar	81	94	101	62	75	82	44	57	64	41	54	61	32	45	52
	40mm Mortar	93	106	110	74	87	91	56	69	73	53	66	70	44	57	61
	Grenade	87	99	102	68	80	83	50	62	65	47	59	62	38	50	53
	Battrle Sim	80	97	102	61	78	83	43	60	65	40	57	62	31	48	53

Table 1 Predicted A-weighted Leq, Lmax levels (together with Z weighted peak sound levels), at various distances from source.

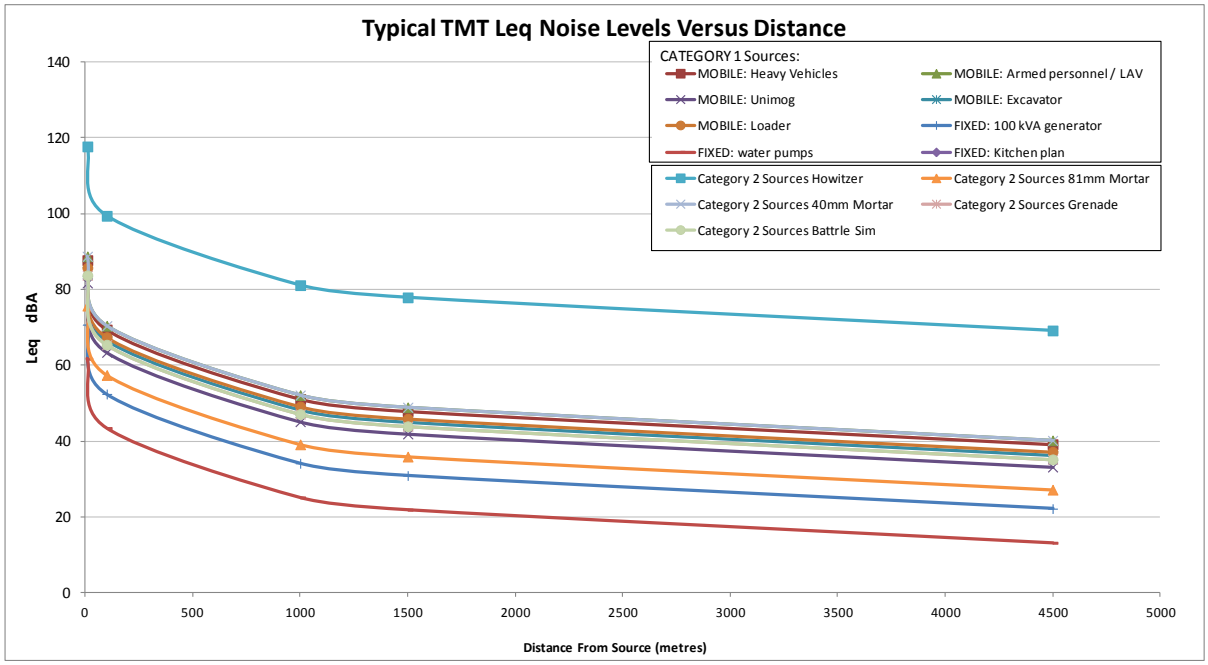

Figure 1 Predicted A-weighted Leq noise levels from a range of TMT activities, including fixed and mobile sources and sounds from live firing, grenades and detonations, estimated for various distances from source.

[4] ISO 9613-2:1996 Acoustics - Attenuation of sound during propagation outdoors -- Part 2: General method of calculation. International Organisation for Standardisation 1996, Geneva.

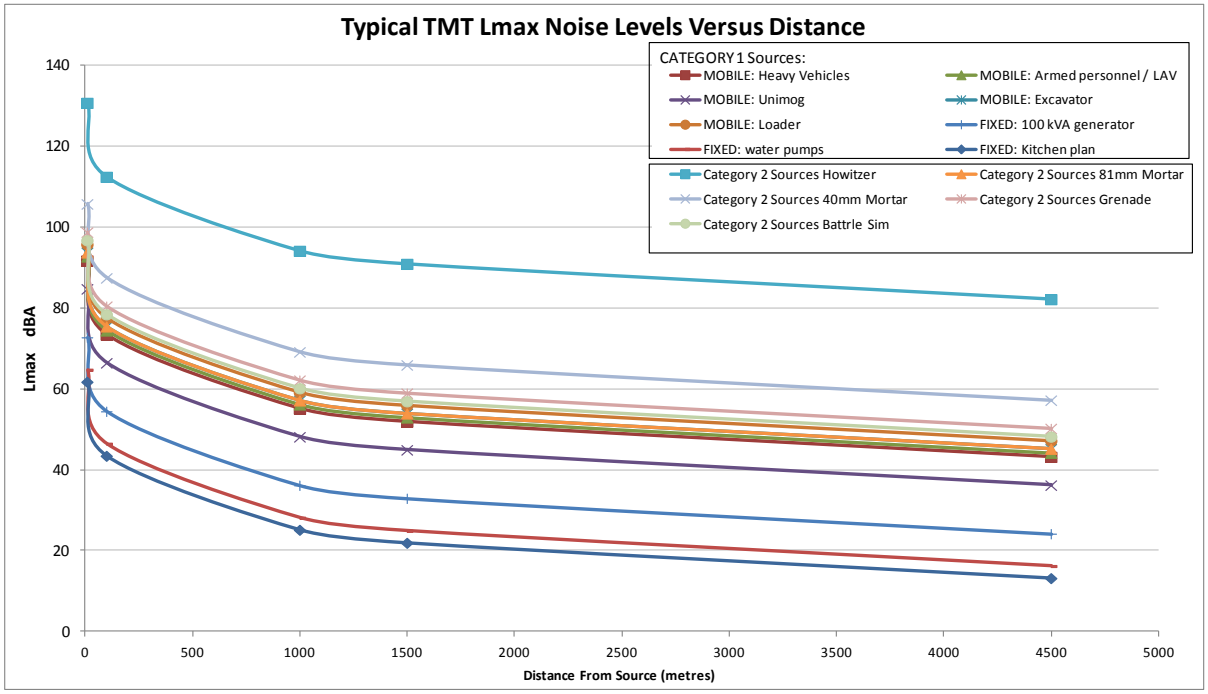

Figure 2 Predicted A-weighted Lmax noise levels from a range of TMT activities, including fixed and mobile sources and sounds from live firing, grenades and detonations, estimated for various distances from source.

Table 1 and **Figures 1** and **2** confirm noise emissions associated with TMT appear to be received at levels that may be adjudged significant when experienced at distances of less than 1,500 metres due to the levels of noise emission at source.

6 Assessment Criteria

6.1 New Zealand Standards

Standards New Zealand has published a number of New Zealand Standards guiding on the measurement and assessment of environmental noise from various sound sources. The review of noise controls applying to TMT activities has taken into account the recommendations of recent versions of the relevant acoustic Standards, particularly involving changes in noise units and guideline limits.

6.2 Current New Zealand Standards

NZ Standards relevant to the measurement and assessment of environmental sound
In the current circumstances are set out Table 1 as follows

1. NZS6801:2008 *Acoustics – Measurement of Environmental Sound*;
2. NZS 6802:2008 *Acoustics –Environmental Noise*;
3. NZS 6803:1999 *Acoustics – Construction Noise*;
4. NZS 6807:1994 *Noise Management and Land Use Planning for Helicopter Landing Areas*

6.3 Current Best Practice Within NZ Standards

The most important acoustic standards referenced within all District Plans are NZS 6801 and NZS 6802 which set out technical guidance on the measurement (NZS6801) and assessment of noise (NZS6802) from most types of land use activities. It is accepted that reference to such technical Standards is necessary to ensure a noise is accurately and reliably measured and assessed, ensuring compliance with the rule is able to be reliably determined.

NZS 6801:2008 *Acoustics - Measurements of Environmental Sound* and NZS6802:2008 *Acoustics - Environmental Noise* are the most appropriate and applicable Standards, at least as a starting point.

Adopting the "best practice" 2008 versions of NZS6801 and NZS6802 means switching to the more modern sound measurement unit from L_{10} to L_{eq}. The L_{10} descriptor was originally adopted as it was demonstrated to have a reasonably good correlation with the degree of annoyance experienced by a person. L_{10} noise levels could be determined from analogue sound level meters by manual means available at the time.

More recent international research has shown that the L_{eq} descriptor has a greater degree of correlation to noise annoyance than L_{10}, and for this reason is widely accepted as being the preferred noise descriptor for use in environmental noise standards and noise limits. The Leq level, being unrelated to the statistical variation in sound levels is more readily predicted which is a considerable advantage over L_{10}.

The L_{eq} level has the advantage that it quantifies all sound energy during the measurement period, whereas L_{10}, effectively measures only that sound which occurs for 10% of the measurement period meaning uneven treatment of intermittent sources.

The regulatory effect of changing the noise limit from say 50 dB L_{A10} to 50 dB $L_{Aeq\ [15\ min]}$ will vary for different sound sources however the effect is not likely to be greater than about 3 dB. For sounds that vary from higher to lower levels in a regular, uniform manner the measured decibel level will measure slightly higher (no more than 3 dB] for L_{10} as opposed to L_{eq}. Thus, for these types of sound retaining the same numerical decibel limit but changing the units from L_{10} to L_{eq} will have the effect of allowing slightly more noise, depending upon the type of sound under consideration. If the sound source is constant (e.g. a constantly running fan or motor] the measured decibel level remains unchanged whether measured using L_{eq} or L_{10}. Unless the variability or intermittency of the sound source is known, it is not possible to make an exact comparison of the effect of changing from the L_{10} unit to the L_{eq} unit.

The recommendation original L_{10} TMT noise limit should retain the same decibel limit with the unit changed from L_{10} to L_{eq}. It is generally accepted by experienced acoustic engineers that there are no realistic situations known where the change from L_{eq} from L_{10} change would lead to significant degradation in amenity. However, the change will allow far more robust monitoring and enforcement which would provide benefit.

6.4 Background Sound Level L95

The recent NZ Standards no longer consider the background sound level (L95) should be controlled in addition to the L10 or Leq level. A switch to Leq unit with its "equal energy" principle will ensure the constant type sound sources are adequately controlled in proportion to the maximum sound, so controls based on L95 are now considered redundant.

In addition, the approach of this report is to include a recommended lowered noise limit for fixed sources. These are the types of sources which operate more or less all the time and which will govern

the levels of L95 emitted from TMT activity sites. Thus, constant sound sources will be adequately controlled with specifying a limit on L95 noise emissions from TMT activities.

For these reasons it is not considered necessary to continue the practice of limiting TMT activity background sound emission levels measured using the L95 sound level.

6.5 Assessment Of Impulse Noise

Clause 1.2 of NZS6802:2008 *Acoustics – Environmental Noise* sets out how that Standard was not designed to assess impulse type sounds such as gunfire and explosions, which means there are this standard provides no guidance relevant to the impulsive sounds associated with Category 2 noise sources discussed above associated with weapons firing, artillery or detonations / pyrotechnics.

In this respect, NZS6803:1999 sets out a guideline maximum "peak" sound levels due to explosions. NZS6803:1999 states at clause 8.1.4;

> **8.1.4**
> Noise from use of explosives is also a special case. The adoption of good blasting practices will reduce the inherent and associated impulsive noise and vibration. Practices should conform with the provisions of documents such as AS 2187:Part 2, provided that the airblast noise limit shall be a peak sound level of 120 dBC measured at a suitable location as specified in 6.2.

The use of the 120 dBC unit is slightly more onerous (although similar in effect to) the 122 dBC limit commonly adopted in TMT noise limits currently included within district plans.

The use of "peak sound level" is a technical necessity in order to ensure the highest sound pressure is adequately captured. The use of the units dBC means the limit is particularly sensitive to impulse noise events with pronounced low frequency content, such as a boom.

Table 1 provides guidance on received peak sound pressure levels from various TMT firing and detonations/ pyrotechnics. Peak sound levels received at 1,500 metres from source are less than 70 dBC (except for Howitzer operations[5]) which are within acceptable levels for daytime. This is confirmed by the Leq values not exceeding 55 dBA and the Lmax values not generally exceeding 70 dBA. These are within the general recommendations for maximum noise exposure at residential sites set out within NZS6802:2008.

In terms of cumulative effects of live weapons firing and detonation/pyrotechnics, Leq sound levels assume these explosive sounds occur more or less continuously over 5 hours worst case noise duration. We are informed this would be representative of a large training event only held infrequently.

Figure A1 set out within the attached ***Appendix A*** sets out cumulative sound level contour lines relevant to the sound levels experienced in the area surrounding the West Melton Training Area during busy periods of target shooting with live ammunition at the Wooster range shown. The cumulative sound over a whole day is calculated using the "Level Day / Night" (Ldn) unit which is the widely accepted method for assessing whole day exposure to noise in the environment . In this case the Ldn values have been calculated based on the C-weighted single event level in order to account for the impulsive nature of the sound from firing and detonations/ explosive sounds associated with TMT activities (normally, for non-impulsive sounds the lower A weighted single event sound level is used as a basis for calculating Ldn).

The Ldn 55 dBA contour shown in ***Figure A1*** encompasses the Ldn 55 dBA contour due to busy periods of live firing. Ldn 55 dBA is widely accepted as a threshold above which adverse effects may commence, with Ldn 65 dBA being a limit above is generally unacceptable for noise sensitive

[5] Howitzer sound level predictions include the sounds of explosive shells – this is an over-estimate typical TMT Howitzer training.

residential land uses (ref. NZS6805, NZS6807, and NZS6809). Thus, taking into account the impulsive nature of the sound, cumulative noise effects experienced beyond 1,500 metres are likely to be acceptable to the affected persons, at least for a person of typical noise sensitivity. A minimum setback distance of 1,500 metres is therefore considered an acceptable approach for controlling worst case daytime live firing and detonation sounds from TMT activities.

In some cases a safety template for some classes of live firing may exceed 1,500 metres and it will be necessary to comply with those requirements irrespective of the noise situation. Although the safety template will assist in ensuring sites selected for TMT involving weapons firing, detonations or pyrotechnics are reasonably set back from sensitive sites, we note the typical templates are not effective at ensuring adequate setbacks to the rear of the firing position where only minimum setbacks are required in order to meet the safety template requirements.

Thus, recommended setback distances for daytime TMT activities emitting impulsive type sounds has been based on measured sound levels in the vicinity of active firing ranges such as West Melton and Tekapo. In order to provide a reasonable standard of protection, including taking into account the impulsive nature of the sound, is 1,500 metres (or greater if this is required for safety reasons).

The following two variations on this scenario are;

Weapons Firing Using Blank Ammunition – In this case we are aware the impulsive sound of a weapon firing blank ammunition is measures lower peak sound levels than the same weapon firing live ammunition. Our research revels measured differences range from 10 dB[6] to 4 dB[7]. In this case a slightly conservative approach has been taken by reducing the setback distance by 50% to 750 metres (based on blanks peak sound levels being 6 dB lower than the same weapon firing live ammunition). Note, this recommendation applies only to TMT involving weapons firing blanks only and that no other explosive or impulsive sound sources.

Night Time Impulsive Noise – owing to the added sensitivity to noise received at dwellings and sensitive sites during night time, we recommend a wider setback be adopted where any explosions or arms firing, grenade throws, etc, are proposed to take place on any site between 7pm and 7 am.

Scaling up the noise sensitivity by 8 to 10 dB to account for increased night time sensitivity results in an increased recommended minimum setback of 4,500 metres. At this distance, although sound events will be noticeable (including indoors), the effects would not be unreasonable when conducted within a pre-planned programme which has been communicated to the affected parties.

In summary, the recommended approach is to manage the location of any weapons firing, explosions, grenade throws, pyrotechnics, etc. as follows

For impulsive sound activities taking place during daytime (7am and 7 pm):

- Activities firing live ammunition to be sited a minimum of 1,500 metres from any noise sensitive site such as at or within the 20 metre notional boundary to any dwelling, or buildings used for residential, educational or health care purposes, or within any residentially zoned site
- A *site-specific noise management plan* is to be implemented where noise sensitive sites are located within 1,500 metres.
- Activities to be sited a minimum of 750 metres from any noise sensitive site where the TMT activity involves only weapons firing of "blank" ammunition (and no other impulsive sounds occur such as weapons firing of live ammunition, explosions, grenade throws, pyrotechnics, etc.).

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[6] See ftp://ftp.rta.nato.int/Pubfulltext/RTO/TR/RTO-TR-HFM-147/TR-HFM-147-03.pdf page 3.15 states *"…peak pressure levels measured for the firing of blank ammunition is almost 10 dB lower than real ammunition."*

7 U.S. Navy Silver Strand E.I.S See http://www.silverstrandtrainingcomplexeis.com/Documents/10_SSTC_Final_EIS_Vol1_Chapter3-6_Acoustic.pdf. Section 3.6, page 20 "*Most blank ammunition for small arms has a smaller propellant charge than that used for live ammunition. As a result, noise from small arms blank ammunition generates noise levels about four decibels below those of live ammunition..."*

For impulsive sound activities taking place during night time (7pm and 7am):

- Activities firing live ammunition to be sited a minimum of 4,500 metres from any noise sensitive site such as at or within the 20 metre notional boundary to any dwelling, or buildings used for residential, educational or health care purposes, or within any residentially zoned site
- A *site-specific noise management plan* is to be implemented where noise sensitive sites are located within 4,500 metres.
- Activities to be sited a minimum of 2,250 metres from any noise sensitive site where the TMT activity involves only weapons firing of "blank" ammunition (and no other impulsive sounds occur such as weapons firing of live ammunition, explosions, grenade throws, pyrotechnics, etc.).

6.6 NZS 6807:1994 *Noise Management and Land Use Planning for Helicopter Landing Areas*

NZS6807:1994 is currently referenced in many District Plans as the standard for assessing helicopter noise. Section 9 the RMA indicates it is within the powers of consent authorities to control the movement of aircraft in the air for the purposes of managing the effects of aircraft noise in the vicinity of landing areas.

The RMA does not empower Councils to control noise from overflying aircraft when aircraft are en route to a destination and not in the vicinity of the landing area. In these situations Section 29A of the Civil Aviation Act 1990 can be used by Civil Aviation Authority [CAA] to control noise from overflying aircraft. As above, due to the highly intermittent nature of any sensitive receiver site receiving helicopter noise associated with TMT activities some allowance can be made for one-off events. This is a recommendation of NZS6802:2008.

Effects are disregarded where the number of landings falls below 10 flights per month (or any event exceeds Lmax 70 dBA between 10pm to 7 am, or Lmax 90 dBA at any other time) these limits representing thresholds for applying the recommendations of NZS6807:1994 (re. Clause 1.1, NZS6807:1994). This approach is recommended to apply to helicopter landing area noise associated TMT activities. A level of helicopter landing activity above this minimum level would be subject to limits on Ldn and Lmax noise levels recommended within NZS6807:1994.

As the pilot in command has ultimate control over whether any noise sensitive locations are affected by helicopter activity associated with TMT activities, the guidance of Appendix A of NZS6807:1994 *Noise Management and Land Use Planning for Helicopter Landing Areas* is proposed to be applied to ensure helicopter noise is minimised as far as practicable. A copy of this appendix is attached as ***Appendix B*** to this report.

The recommendations to limit helicopter noise associated with the use of any TMT site for helicopter landing or take-off is based on NZS6807:1994. This Standard is considered to limit helicopter noise to reasonable levels. Noise from airborne helicopter activity not associated with landing areas (such as flyover noise) cannot be controlled by district plans but is instead is a matter for the CAA t control.

6.7 Vibration

The RMA defines "noise" as including vibration. While humans are very sensitive to vibration and can detect this effect at low levels, it is difficult to precisely define levels which will adequately protect people from adverse effects (eg. annoyance] as a person's perception and response will vary according to the nature of vibration (duration, amplitude, frequency, and frequency of occurrence], health, state of mind, temperament, and physical attitude of individuals.

Taking into account available guidelines and standards, and the nature and scale of potential vibration effects associated with TMT activities, a minimum threshold distance of 1,500 metres for live firing (& 750 metres where blanks are used) has been recommended as setback(s) offering sufficient protection for vibration effects both on humans or damage risk criteria for building damage. Where these activities take place within the nominated minimum setback, compliance with the recommended limit on peak sound pressure levels of 120 dBC would ensure airborne and ground borne vibration effects are adequately controlled to acceptable levels.

7 Recommended Noise Limits

As a starting point, for sound sources that are within scope of NZS6802:2008, that standard provides appropriate guidance on noise limits. However special consideration needs to be given to the need to conduct TMT activities throughout the district and at any time. This does not absolve the NZDF from adequate noise management however. Mobile sources generate intermittent effects for any particular receiver site and mostly during daytime. Stringent noise limits such as the upper limits recommended within NZS6802:2008 are not considered necessary for this type of sound when elevated noise levels are only experienced for short periods during daytime. NZS6803:1999 contains recommended Leq and Lmax limits for noise sensitive sites during daytime and night time intended to apply to construction activities, however in this case these limits are recommended to apply to noise emitted by mobile TMT activities.

TMT activities involving weapons firing, detonations and pyrotechnics require specialised noise management owing to the impulsive nature of these sounds which can be particularly annoying in some cases. Below it is recommended TMT activities involving weapons firing and any other activities creating single or multiple explosive event sounds audible off the site should only be undertake on sites where there are no noise sensitive sites located within a radius of:

- 1,500 metres for any such activities occurring 7am to 7pm unless the only impulsive sound from TMT activities is from firing of "blank" ammunition, in which case the minimum setback distance maybe reduced to 750 metres.
- 4,500 metres for any such activities occurring 7pm to 7am

In special cases (and only when undertaken in accordance with a Noise Management Plan certified by the Council) would TMT activities involving weapons firing, detonations and pyrotechnics be permitted to occur within these specified setback distances, however no sensitive receiver site should receive a peak sound pressure level of 120 dBC when in accordance with NZS6801:2008 *Acoustics – Measurement of Sound*.

In summary the recommended approach is based on;

1. Impulsive sound – this type of sound is not within the scope of NZS6802:2008. In this case minimum setback distances are proposed to be applied (separately for daytime and night time), with the absolute limit of 120 dBC (from NZS6803:1999) applying to impulsive sound sources. Where certain recommended setback distances cannot be reasonably complied with, the training activities are recommended to be undertaken in accordance with a site specific noise management plan approved for this purpose. No sensitive receiver site is recommended to receive impulsive sound at levels exceeding 120 dBC;

2. Mobile sources, although technically within scope of NZS6802:2008, are considered more appropriately controlled to the noise limits set out within NZS6803:1999 owing to the intermittent noise effects and temporary nature of noise associated with TMT activities. While NZS6803:1999 provides for elevated noise during daytime, Leq and Lmax night time limits recommended within this Standard are appropriate for the adequate protection of sleep at sensitive receiver sites during night time and on Sundays and public holidays.

3. Fixed or stationary TMT Noise sources that are able to be mitigated due to the equipment selection, its location, and treatment are considered fully capable of meeting the following stringent limits at noise sensitive receiver sites, as set out within NZS6802:2008 as follows;

Monday to Sunday 7am to 7pm.....55 dB $L_{Aeq\ (15\ min)}$
Monday to Sunday 7pm to 10pm.....50 dB $L_{Aeq\ (15\ min)}$
Monday to Sunday 10pm to 7am the next day .....45 dB $L_{Aeq\ (15\ min)}$
Monday to Sunday 10pm to 7am the next day .....75 dB L_{AFmax}

These limits are considered appropriate for controlling noise from fixed (stationary) plant to reasonable levels. The limits incorporate an intermediate noise limit applying within a transition "evening" daytime period between 7pm and 10pm. The rationale is that the daytime limit is often too high for the evening leaving compliant noise sources becoming quite prominent within an environment which is experiencing lowering of ambient sound levels towards the end of the day.

8 Summary

This report reviews noise and vibration controls applying to Temporary Military Training (TMT) activities specified within District Plans for the control of potential noise disturbance caused by these activities. These established noise limits and requirements have been evaluated from an effectiveness and efficiency perspective, also considering new techniques now available through the adoption more recent NZS acoustic standards released since most District Plans came into effect.

The recommended amended controls do not rely solely on specifying decibel limits applicable to each category of noise source. Achieving a minimum threshold separation distance from sites where potentially noisy weapons firing or loud explosive sounds take place to the nearest noise sensitive receiver site is a key element of the approach recommended for this noise source category which has the highest potential to create adverse noise effects over wide areas. TMT activities involving firing and explosive sounds are proposed to be permitted to occur within the minimum separation distances outlined below, however in those cases the activities would be required to be undertaken in accordance with a certified Noise Management Plan to ensure the heightened risk of adverse noise effects is adequately managed. Limits applying to peak sound pressure levels from TMT activities involving weapons firing or explosive sounds applying at the closest sensitive receiver site ensures an adequate baseline protection from the potential health and amenity effects of loud noise received from these sources.

Measures to mitigate noise emissions associated with TMT activities are included within the recommended wording. Overall, the recommended approach provides flexibility in avoiding unreasonable or excessive noise effects as the limits and requirements target specific sources according to the scale of the potential effects and the ability to control such sources.

Considered as a whole, the recommended approach provides an effective and flexible approach which recognises the over arching duty to adopt the "best practicable option" to avoid the emission of unreasonable noise. Adopting the amended approach within new generation District Plans will ensure the rules are technically up to date, whilst ensuring the control measures fit the type of sound source and a degree of flexibility is provided given the temporary nature of the potential noise and vibration.

Malcolm Hunt M.E.(mech), B.Sc., Dip Public Health, Dip Noise Control
January 2013

Appendix A

Extract From:

West Melton Military Training Area - 2003 Preliminary Noise Assessment Report, NZ Army. Malcolm Hunt Associates 2003.

Activity on firing range:

Activity	Estimated Future Firing
Single shot 5.56mm	4 days/week
Group shoot 5.56mm	4 days/week
GPMG (7.62mm machine gun) single bursts	2 days/week
GPMG (7.62 mm machine gun) rapid fire	2 days/week
M72 Sub Cal	2100 /year

Predicted Ldn contours (numbered white lines), and radius of 1.5 kilometres from firing location (yellow dashed line).

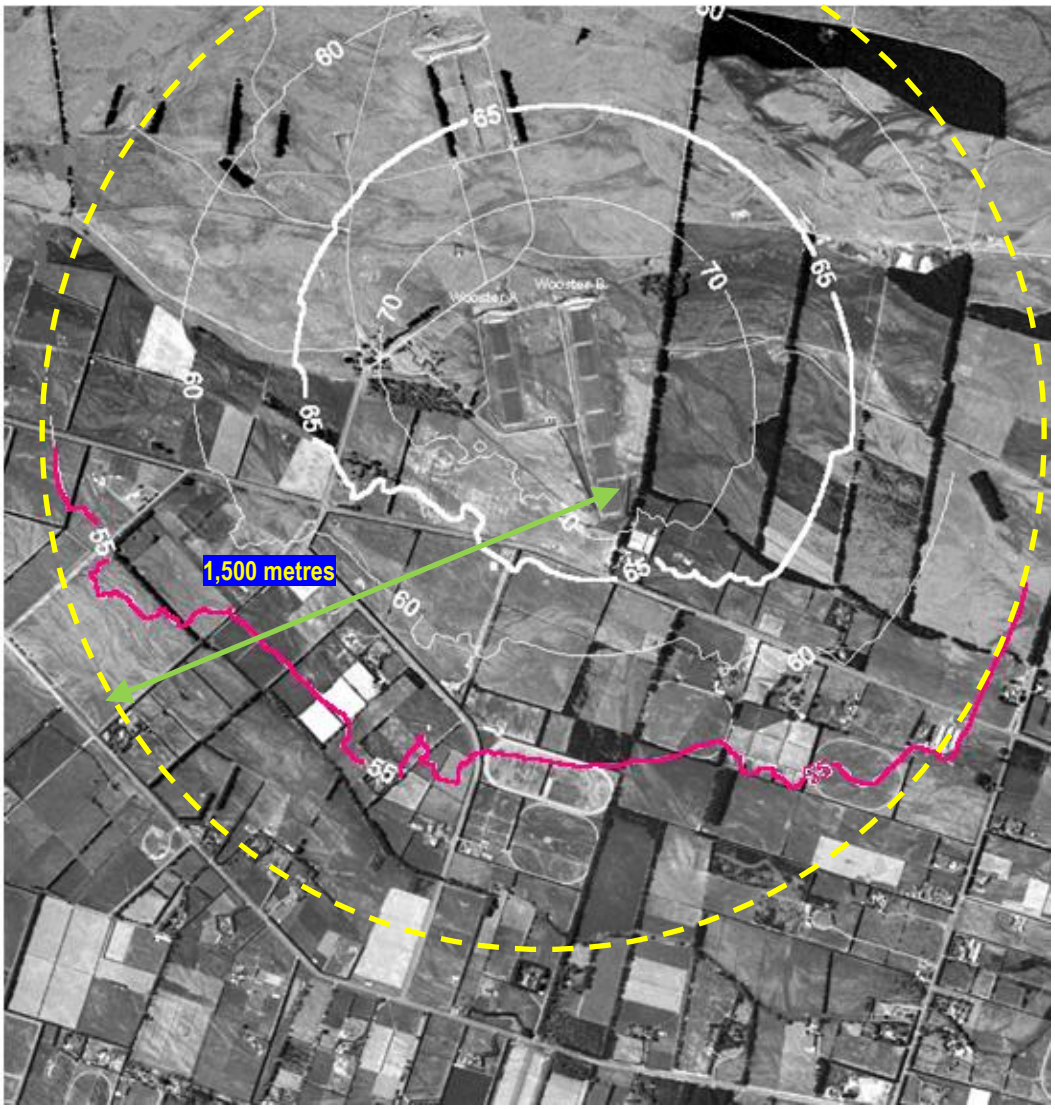

Figure A1. Predicted West Melton Ldn noise contours for use of firing ranges only, also showing Ldn 55 Contour (—) lies within the (dotted) is a 1.5 kilometre radius from the closest firing locations.

Appendix B

NZS 6807:1994 - Appendix A

Noise Management

A1
The sections below contain matters that should be considered in the management of noise from helicopter landing areas so as to comply with the noise limits in this Standard. The matters below apply to helicopter landing areas in general, and may not all be applicable in any particular case.

A2 Management considerations

A2.1
All helicopter movements should be flown in accordance with noise abatement techniques.

A2.2
A log record should be kept of all movements. A copy should be available at the request of the appropriate local authority.

CA2.2
Compliance with noise controls may be determined from the number and time of movements and the type of helicopter if noise emission is known.

A2.3
Helicopters using a helicopter landing area may be restricted to those with a certified noise emission not exceeding a specified limit. In this ease no helicopter generating noise that exceeds the limit should use the helicopter landing area.

A2.4
Flight sectors should be restricted to avoid residential areas, as far as it is practicable to do so. Helicopters should minimize overflights of dwellings while at less than 500 feet above ground level.

A2.5
Movements should be restricted to avoid noise-sensitive times of day, as far as it is practicable to do so.

A2.6
Flight operations may be registered to normal arrival and departures. Flight training (including hover training), extended ground idling or engine testing may be prohibited.

A2.7
Movements may be restricted to a daily maximum.